

## SEQUENCE LISTING

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<110> MISHRA, LOPA
<120> GENES CODING FOR EARLY LIVER DEVELOPMENT...
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<150> 09/431,184
<151> 1999-11-01
<150> PCT/US98/08656
<151> 1998-04-30
<150> US 08/841,349
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| Leu | Gln | Ala | Phe | Asn | Thr | Tyr | Arg | Thr | Val | Glu | Lys | Pro | Pro | Lys | Phe |      |
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| Thr | Glu | Lys | Gly | Asn | Leu | Glu | Val | Leu | Leu | Phe | Ala | Ile | Gln | Ser | Lys |      |
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| Met | Arg | Ala | Asn | Asn | Gln | Lys | Val | Tyr | Met | Pro | Arg | Glu | Gly | Lys | Leu |      |
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| Ile | Ser | Asp | Ile | Asn | Lys | Ala | Trp | Glu | Arg | Leu | Glu | Lys | Ala | Glu | His |      |
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| Glu | Arg | Glu | Leu | Ala | Leu | Arg | Asn | Glu | Leu | Ile | Arg | Gln | Glu | Lys | Leu |      |
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| Glu | Gln | Leu | Ala | Arg | Arg | Phe | Asp | Arg | Lys | Ala | Ala | Met | Arg | Glu | Thr |      |
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| gcc | agg | gaa | ctt | gaa | gcc | gag | aac | tac | cat | gac | atc | aag | cgc | atc | aca | 1793 |
| Ala | Arg | Glu | Leu | Glu | Ala | Glu | Asn | Tyr | His | Asp | Ile | Lys | Arg | Ile | Thr |      |
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| gcg | agg | aag | gac | aat | gtc | atc | cgg | ctc | tgg | gaa | tac | ttg | ctg | gaa | ctg | 1841 |
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| ctc | agg | gcc | agg | agg | cag | cgt | ctt | gag | atg | aac | ctg | gga | ttg | caa | aag | 1889 |
| Leu | Arg | Ala | Arg | Arg | Gln | Arg | Leu | Glu | Met | Asn | Gly | Leu | Gln | Lys |     |      |
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| Val | Leu | Leu | Leu | Ser | Gln | Asp | Tyr | Gly | Lys | His | Leu | Leu | Gly | Val | Glu |      |
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| gac | ctg | tta | cag | aag | cat | gcc | ctg | gtt | gaa | gca | gac | att | gca | atc | caa | 2033 |
| Asp | Leu | Leu | Gln | Lys | His | Ala | Leu | Val | Glu | Ala | Asp | Ile | Ala | Ile | Gln |      |
|     |     | 555 |     |     |     |     | 560 |     |     |     |     | 565 |     |     |     |      |
| gca | gag | cgt | gta | aga | ggt | gtg | aat | gcc | tct | gcc | cag | aag | ttt | gca | aca | 2081 |
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|     | 570 |     |     |     | 575 |     |     |     |     |     | 580 |     |     |     |     |      |
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| Asp | Gly | Glu | Gly | Tyr | Lys | Pro | Cys | Asp | Pro | Gln | Val | Ile | Arg | Asp | Arg |      |
|     | 585 |     |     |     | 590 |     |     | 595 |     |     |     |     |     |     |     |      |
| gtt | gcc | cac | atg | gag | ttc | tgc | tat | caa | gag | ctt | tgt | cag | ctg | gct | gcc | 2177 |
| Val | Ala | His | Met | Glu | Phe | Cys | Tyr | Gln | Glu | Leu | Cys | Gln | Leu | Ala | Ala |      |
| 600 |     |     |     | 605 |     |     |     | 610 |     |     |     |     |     | 615 |     |      |
| gag | cgt | agg | gct | cgc | ctg | gaa | gag | tcc | cgt | cgc | ctc | tgg | aag | ttc | ttc | 2225 |
| Glu | Arg | Arg | Ala | Arg | Leu | Glu | Glu | Ser | Arg | Arg | Leu | Trp | Lys | Phe | Phe |      |
|     |     |     | 620 |     |     |     |     | 625 |     |     |     |     | 630 |     |     |      |
| tgg | gag | atg | gca | gaa | gag | gaa | ggc | tgg | ata | cga | gag | aag | gaa | aag | atc | 2273 |
| Trp | Glu | Met | Ala | Glu | Glu | Glu | Gly | Trp | Ile | Arg | Glu | Lys | Glu | Lys | Ile |      |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| ctg | tcc | tct | gat | gat | tac | ggg | aaa | gac | ttg | acc | agt | gtc | atg | cgc | ctg | 2321 |
| Leu | Ser | Ser | Asp | Asp | Tyr | Gly | Lys | Asp | Leu | Thr | Ser | Val | Met | Arg | Leu |      |
|     |     | 650 |     |     |     |     | 655 |     |     |     |     | 660 |     |     |     |      |
| ctg | agc | aag | cac | cgg | gca | ttt | gag | gat | gag | atg | agt | ggc | cgt | agt | ggc | 2369 |
| Leu | Ser | Lys | His | Arg | Ala | Phe | Glu | Asp | Glu | Met | Ser | Gly | Arg | Ser | Gly |      |
|     | 665 |     |     |     |     | 670 |     |     |     |     | 675 |     |     |     |     |      |
| cat | ttt | gag | cag | gcc | att | aaa | gaa | ggt | gaa | gac | atg | att | gca | gag | gaa | 2417 |
| His | Phe | Glu | Gln | Ala | Ile | Lys | Glu | Gly | Glu | Asp | Met | Ile | Ala | Glu | Glu |      |
| 680 |     |     |     |     | 685 |     |     |     |     | 690 |     |     |     |     | 695 |      |
| cac | ttt | gga | tcg | gaa | aag | atc | cgt | gag | aga | atc | att | tat | atc | cgg | gag | 2465 |
| His | Phe | Gly | Ser | Glu | Lys | Ile | Arg | Glu | Arg | Ile | Ile | Tyr | Ile | Arg | Glu |      |
|     |     |     |     | 700 |     |     |     |     | 705 |     |     |     |     | 710 |     |      |
| cag | tgg | gcc | aac | ctg | gaa | cag | ctc | tca | gcc | att | agg | aag | aag | cgc | cta | 2513 |
| Gln | Trp | Ala | Asn | Leu | Glu | Gln | Leu | Ser | Ala | Ile | Arg | Lys | Lys | Arg | Leu |      |
|     |     |     | 715 |     |     |     | 720 |     |     |     |     |     | 725 |     |     |      |
| gag | gaa | gcc | tca | tta | ctg | cac | cag | ttc | cag | gct | gat | gct | gat | gat | att | 2561 |
| Glu | Glu | Ala | Ser | Leu | Leu | His | Gln | Phe | Gln | Ala | Asp | Ala | Asp | Asp | Ile |      |
|     | 730 |     |     |     |     | 735 |     |     |     |     |     | 740 |     |     |     |      |
| gat | gct | tgg | atg | tta | gat | ata | ctc | aag | att | gtc | tcc | agc | aat | gat | gtg | 2609 |
| Asp | Ala | Trp | Met | Leu | Asp | Ile | Leu | Lys | Ile | Val | Ser | Ser | Asn | Asp | Val |      |
|     | 745 |     |     |     | 750 |     |     |     |     | 755 |     |     |     |     |     |      |
| ggc | cat | gat | gag | tac | tcc | acg | cag | tct | ctg | gtc | aag | aag | cat | aaa | gat | 2657 |
| Gly | His | Asp | Glu | Tyr | Ser | Thr | Gln | Ser | Leu | Val | Lys | Lys | His | Lys | Asp |      |
| 760 |     |     |     |     | 765 |     |     |     | 770 |     |     |     |     |     | 775 |      |
| gta | gca | gaa | gag | atc | acc | aac | tgc | agg | ccc | act | att | gac | aca | ctg | cat | 2705 |
| Val | Ala | Glu | Glu | Ile | Thr | Asn | Cys | Arg | Pro | Thr | Ile | Asp | Thr | Leu | His |      |
|     |     |     |     | 780 |     |     |     |     | 785 |     |     |     |     | 790 |     |      |
| gag | caa | gcc | agt | gcc | ctt | cca | caa | gca | cat | gca | gag | tct | cca | gat | gtg | 2753 |
| Glu | Gln | Ala | Ser | Ala | Leu | Pro | Gln | Ala | His | Ala | Glu | Ser | Pro | Asp | Val |      |
|     |     |     | 795 |     |     |     | 800 |     |     |     |     |     | 805 |     |     |      |
| aag | ggc | cgg | ctg | gca | gga | att | gag | gag | cgc | tgc | aag | gag | atg | gca | gag | 2801 |
| Lys | Gly | Arg | Leu | Ala | Gly | Ile | Glu | Glu | Arg | Cys | Lys | Glu | Met | Ala | Glu |      |
|     | 810 |     |     |     |     | 815 |     |     |     |     |     | 820 |     |     |     |      |
| tta | aca | cgg | cta | agg | aag | cag | gct | ctg | cag | gac | acc | ctg | gcc | ctg | tac | 2849 |
| Leu | Thr | Arg | Leu | Arg | Lys | Gln | Ala | Leu | Gln | Asp | Thr | Leu | Ala | Leu | Tyr |      |
|     | 825 |     |     |     | 830 |     |     |     |     |     | 835 |     |     |     |     |      |
| aag | atg | ttc | agt | gag | gct | gat | gcc | tgt | gag | ctc | tgg | att | gac | gag | aag | 2897 |
| Lys | Met | Phe | Ser | Glu | Ala | Asp | Ala | Cys | Glu | Leu | Trp | Ile | Asp | Glu | Lys |      |
| 840 |     |     |     |     | 845 |     |     |     | 850 |     |     |     |     |     | 855 |      |
| gag | cag | tgg | ctc | aac | aac | atg | cag | atc | cca | gag | aag | ctg | gag | gac | ctg | 2945 |
| Glu | Gln | Trp | Leu | Asn | Met | Gln | Ile | Pro | Glu | Lys | Leu | Glu | Asp | Leu |     |      |
|     |     |     |     | 860 |     |     |     | 865 |     |     |     |     |     | 870 |     |      |
| gaa | gtc | atc | cag | cac | aga | ttt | gag | agc | cta | gaa | cca | gaa | atg | aac | aac | 2993 |
| Glu | Val | Ile | Gln | His | Arg | Phe | Glu | Ser | Leu | Glu | Pro | Glu | Met | Asn | Asn |      |
|     |     |     | 875 |     |     |     |     | 880 |     |     |     |     | 885 |     |     |      |
| cag | gct | tcc | cgg | gtt | gct | gtg | gtg | aac | cag | att | gca | cgg | cag | ctg | atg | 3041 |
| Gln | Ala | Ser | Arg | Val | Ala | Val | Val | Asn | Gln | Ile | Ala | Arg | Gln | Leu | Met |      |
|     | 890 |     |     |     |     | 895 |     |     |     |     |     | 900 |     |     |     |      |
| cac | aat | ggc | cac | ccc | agt | gaa | aag | gaa | atc | aga | gct | cag | caa | gac | aaa | 3089 |
| His | Asn | Gly | His | Pro | Ser | Glu | Lys | Glu | Ile | Arg | Ala | Gln | Gln | Asp | Lys |      |
|     | 905 |     |     |     | 910 |     |     |     |     |     | 915 |     |     |     |     |      |
| ctc | aac | acg | agg | tgg | agt | cag | ttc | aga | gaa | ctg | gtg | gac | agg | aaa | aag | 3137 |
| Leu | Asn | Thr | Arg | Trp | Ser | Gln | Phe | Arg | Glu | Leu | Val | Asp | Arg | Lys | Lys |      |
| 920 |     |     |     |     | 925 |     |     |     | 930 |     |     |     |     |     | 935 |      |
| gat | gct | ctt | ctg | tct | gcc | ctg | agc | atc | cag | aac | tac | cac | ctc | gag | tgc | 3185 |
| Asp | Ala | Leu | Leu | Ser | Ala | Leu | Ser | Ile | Gln | Asn | Tyr | His | Leu | Glu | Cys |      |
|     |     |     |     | 940 |     |     |     | 945 |     |     |     |     |     | 950 |     |      |
| aat | gaa | acc | aaa | tcc | tgc | atc | cgg | gag | aag | acc | aag | gtc | atc | gag | tct | 3233 |
| Asn | Glu | Thr | Lys | Ser | Cys | Ile | Arg | Glu | Lys | Thr | Lys | Val | Ile | Glu | Ser |      |
|     |     |     | 955 |     |     |     |     | 960 |     |     |     |     | 965 |     |     |      |
| acc | caa | gac | ctt | ggc | aat | gac | ctg | gca | ggt | gtc | atg | gcc | ctg | cag | tgc | 3281 |
| Thr | Gln | Asp | Leu | Gly | Asn | Asp | Leu | Ala | Gly | Val | Met | Ala | Leu | Gln | Cys |      |
|     |     | 970 |     |     |     | 975 |     |     |     |     |     | 980 |     |     |     |      |
| aag | ctg | act | ggc | atg | gaa | cga | gac | ttg | gta | gcc | att | gag | gcg | aag | ctg | 3329 |

Lys Leu Thr Gly Met Glu Arg Asp Leu Val Ala Ile Glu Ala Lys Leu  
 985 990 995  
 agt gac ctg cag aaa gaa gct gag aag ctg gag tcc gag cac cct gac 3377  
 Ser Asp Leu Gln Lys Glu Ala Glu Lys Leu Glu Ser Glu His Pro Asp  
 1000 1005 1010 1015  
 cag gct caa gct atc ctg tct cgg ctg gcc gag atc agt gat gtg tgg 3425  
 Gln Ala Gln Ala Ile Leu Ser Arg Leu Ala Glu Ile Ser Asp Val Trp  
 1020 1025 1030  
 gag gaa atg aag aca acc ctg aag aac cga gag gcc tcc ctg gga gag 3473  
 Glu Glu Met Lys Thr Thr Leu Lys Asn Arg Glu Ala Ser Leu Gly Glu  
 1035 1040 1045  
 gcc agc aag ctg cag cag ttt ctg cgg gac ttg gac gac ttc cag tct 3521  
 Ala Ser Lys Leu Gln Gln Phe Leu Arg Asp Leu Asp Asp Phe Gln Ser  
 1050 1055 1060  
 tgg ctg tcc agg acc cag act gct atc gcc tca gag gac atg ccc aat 3569  
 Trp Leu Ser Arg Thr Gln Thr Ala Ile Ala Ser Glu Asp Met Pro Asn  
 1065 1070 1075  
 acc ctg act gag gca gag aag ctt ctg aca cag cac gag aat atc aaa 3617  
 Thr Leu Thr Glu Ala Glu Lys Leu Leu Thr His Glu Asn Ile Lys  
 1080 1085 1090 1095  
 aat gag atc gac aat tat gag gaa gac tac cag aag atg cgg gac atg 3665  
 Asn Glu Ile Asp Asn Tyr Glu Glu Asp Tyr Gln Lys Met Arg Asp Met  
 1100 1105 1110  
 ggc gag atg gtc acc cag ggg cag act gat gcc cag tat atg ttt ctg 3713  
 Gly Glu Met Val Thr Gln Gly Gln Thr Asp Ala Gln Tyr Met Phe Leu  
 1115 1120 1125  
 cgg cag cgg ctg cag gcc tta gac act ggc tgg aat gag ctg cac aaa 3761  
 Arg Gln Arg Leu Gln Ala Leu Asp Thr Gly Trp Asn Glu Leu His Lys  
 1130 1135 1140  
 atg tgg gag aac agg caa aac ctg ctg tcc cag tcc cat gcc tac cag 3809  
 Met Trp Glu Asn Arg Gln Asn Leu Leu Ser Gln Ser His Ala Tyr Gln  
 1145 1150 1155  
 cag ttc ctt agg gac acc aaa caa gct gaa gct ttt ctt aat aac cag 3857  
 Gln Phe Leu Arg Asp Thr Lys Gln Ala Glu Ala Phe Leu Asn Asn Gln  
 1160 1165 1170 1175  
 gag tat gtt ttg gct cat act gaa atg ccc acc acc ctg gaa gga gct 3905  
 Glu Tyr Val Leu Ala His Thr Glu Met Pro Thr Thr Leu Glu Gly Ala  
 1180 1185 1190  
 gaa gca gcc att aaa aag cag gag gac ttc atg acc acc atg gat gcc 3953  
 Glu Ala Ala Ile Lys Lys Gln Glu Asp Phe Met Thr Thr Met Asp Ala  
 1195 1200 1205  
 aac gag gag aag atc aat gct gtt gtg gag act ggc cga aga ctg gtg 4001  
 Asn Glu Glu Lys Ile Asn Ala Val Val Glu Thr Gly Arg Arg Leu Val  
 1210 1215 1220  
 agc gat ggg aac atc aac tcc gac cgc atc cag gag aag gtg gac tct 4049  
 Ser Asp Gly Asn Ile Asn Ser Asp Arg Ile Gln Glu Lys Val Asp Ser  
 1225 1230 1235  
 att gac gac aga cac agg aag aat cga gaa gca gcc agt gaa ctt ctg 4097  
 Ile Asp Asp Arg His Arg Lys Asn Arg Glu Ala Ala Ser Glu Leu Leu  
 1240 1245 1250 1255  
 atg agg tta aag gac aac cgt gat cta cag aag ttc ctg caa gat tgt 4145  
 Met Arg Leu Lys Asp Asn Arg Asp Leu Gln Lys Phe Leu Gln Asp Cys  
 1260 1265 1270  
 caa gag ctg tcc ctg tgg atc aat gaa aag atg ctt aca gct caa gac 4193  
 Gln Glu Leu Ser Leu Trp Ile Asn Glu Lys Met Leu Thr Ala Gln Asp  
 1275 1280 1285  
 atg tct tat gat gaa gcc aga aat ctg cac agt aaa tgg tta aag cat 4241  
 Met Ser Tyr Asp Glu Ala Arg Asn Leu His Ser Lys Trp Leu Lys His  
 1290 1295 1300  
 caa gca ttt atg gcg gaa ctt gca tcc aac aaa gaa tgg ctt gac aaa 4289  
 Gln Ala Phe Met Ala Glu Leu Ala Ser Asn Lys Glu Trp Leu Asp Lys  
 1305 1310 1315  
 att gag aag gaa gga atg cag ctt att tca gaa aag cca gaa aca gaa 4337  
 Ile Glu Lys Glu Gly Met Gln Leu Ile Ser Glu Lys Pro Glu Thr Glu  
 1320 1325 1330 1335

|     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |      |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|------|
| gct | gtg  | gta  | aag  | gaa  | aaa  | ctc  | act  | ggt  | tta  | cat  | aaa  | atg  | tgg  | gaa  | gtc | 4385 |
| Ala | Val  | Val  | Lys  | Glu  | Lys  | Leu  | Thr  | Gly  | Leu  | His  | Lys  | Met  | Trp  | Glu  | Val |      |
|     |      |      |      | 1340 |      |      |      |      | 1345 |      |      |      |      | 1350 |     |      |
| ctt | gaa  | tcc  | aca  | acc  | cag  | acc  | aag  | gcc  | cag  | cgg  | ctc  | ttt  | gat  | gca  | aat | 4433 |
| Leu | Glu  | Ser  | Thr  | Thr  | Gln  | Thr  | Lys  | Ala  | Gln  | Arg  | Leu  | Phe  | Asp  | Ala  | Asn |      |
|     |      |      | 1355 |      |      |      |      | 1360 |      |      |      |      | 1365 |      |     |      |
| aag | gct  | gag  | ctt  | ttc  | aca  | caa  | agc  | tgc  | gca  | gat  | ctt  | gac  | aaa  | tgg  | cta | 4481 |
| Lys | Ala  | Glu  | Leu  | Phe  | Thr  | Gln  | Ser  | Cys  | Ala  | Asp  | Leu  | Asp  | Lys  | Trp  | Leu |      |
|     |      | 1370 |      |      |      |      | 1375 |      |      |      |      | 1380 |      |      |     |      |
| cat | ggc  | ctg  | gag  | agc  | cag  | att  | caa  | tct  | gac  | gac  | tat  | ggc  | aaa  | gac  | ctt | 4529 |
| His | Gly  | Leu  | Glu  | Ser  | Gln  | Ile  | Gln  | Ser  | Asp  | Asp  | Tyr  | Gly  | Lys  | Asp  | Leu |      |
|     | 1385 |      |      |      | 1390 |      |      |      |      |      | 1395 |      |      |      |     |      |
| acc | agt  | gtc  | aat  | att  | ctt  | ctg  | aaa  | aag  | caa  | cag  | atg  | ctg  | gag  | aat  | cag | 4577 |
| Thr | Ser  | Val  | Asn  | Ile  | Leu  | Leu  | Lys  | Lys  | Gln  | Gln  | Met  | Leu  | Glu  | Asn  | Gln |      |
|     | 1400 |      |      |      | 1405 |      |      |      | 1410 |      |      |      |      | 1415 |     |      |
| atg | gaa  | gtt  | cgg  | aag  | aaa  | gag  | atc  | gag  | gaa  | ctg  | cag  | agc  | caa  | gcc  | cag | 4625 |
| Met | Glu  | Val  | Arg  | Lys  | Lys  | Glu  | Ile  | Glu  | Glu  | Leu  | Gln  | Ser  | Gln  | Ala  | Gln |      |
|     |      |      | 1420 |      |      |      |      | 1425 |      |      |      |      | 1430 |      |     |      |
| gcg | ctg  | agt  | cag  | gag  | ggg  | aag  | agc  | aca  | gat  | gag  | gtg  | gac  | agc  | aaa  | cgc | 4673 |
| Ala | Leu  | Ser  | Gln  | Glu  | Gly  | Lys  | Ser  | Thr  | Asp  | Glu  | Val  | Asp  | Ser  | Lys  | Arg |      |
|     |      | 1435 |      |      |      |      | 1440 |      |      |      |      | 1445 |      |      |     |      |
| ctt | act  | gtg  | cag  | acc  | aag  | ttc  | atg  | gag  | ctt  | ctg  | gag  | ccc  | ttg  | agt  | gag | 4721 |
| Leu | Thr  | Val  | Gln  | Thr  | Lys  | Phe  | Met  | Glu  | Leu  | Leu  | Glu  | Pro  | Leu  | Ser  | Glu |      |
|     |      | 1450 |      |      |      | 1455 |      |      |      |      |      | 1460 |      |      |     |      |
| agg | aag  | cat  | aac  | ctg  | tta  | gct  | tcc  | aag  | gag  | atc  | cat  | cag  | ttc  | aac  | agg | 4769 |
| Arg | Lys  | His  | Asn  | Leu  | Leu  | Ala  | Ser  | Lys  | Glu  | Ile  | His  | Gln  | Phe  | Asn  | Arg |      |
|     | 1465 |      |      |      | 1470 |      |      |      |      | 1475 |      |      |      |      |     |      |
| gat | gtg  | gag  | gac  | gaa  | atc  | cta  | tgg  | gtt  | ggc  | gag  | agg  | atg  | cct  | ttg  | gca | 4817 |
| Asp | Val  | Glu  | Asp  | Glu  | Ile  | Leu  | Trp  | Val  | Gly  | Glu  | Arg  | Met  | Pro  | Leu  | Ala |      |
|     | 1480 |      |      | 1485 |      |      |      | 1490 |      |      |      |      | 1495 |      |     |      |
| act | tcc  | aca  | gat  | cat  | ggc  | cat  | aac  | ctt  | caa  | act  | gtg  | cag  | ctg  | tta  | ata | 4865 |
| Thr | Ser  | Thr  | Asp  | His  | Gly  | His  | Asn  | Leu  | Gln  | Thr  | Val  | Gln  | Leu  | Leu  | Ile |      |
|     |      |      | 1500 |      |      |      |      | 1505 |      |      |      |      | 1510 |      |     |      |
| aag | aaa  | aac  | cag  | acc  | ctc  | cag  | aaa  | gaa  | atc  | cag  | gga  | cac  | cag  | cct  | cgt | 4913 |
| Lys | Lys  | Asn  | Gln  | Thr  | Leu  | Gln  | Lys  | Glu  | Ile  | Gln  | Gly  | His  | Gln  | Pro  | Arg |      |
|     |      | 1515 |      |      |      |      |      | 1520 |      |      |      | 1525 |      |      |     |      |
| att | gat  | gac  | atc  | ttt  | gag  | agg  | agt  | caa  | aac  | atc  | atc  | aca  | gat  | agc  | agc | 4961 |
| Ile | Asp  | Asp  | Ile  | Phe  | Glu  | Arg  | Ser  | Gln  | Asn  | Ile  | Ile  | Thr  | Asp  | Ser  | Ser |      |
|     | 1530 |      |      |      |      | 1535 |      |      |      |      |      | 1540 |      |      |     |      |
| agc | ctc  | aat  | gcc  | gag  | gct  | atc  | agg  | cag  | agg  | ctc  | gct  | gac  | ctg  | aag  | cag | 5009 |
| Ser | Leu  | Asn  | Ala  | Glu  | Ala  | Ile  | Arg  | Gln  | Arg  | Leu  | Ala  | Asp  | Leu  | Lys  | Gln |      |
|     | 1545 |      |      |      | 1550 |      |      |      |      | 1555 |      |      |      |      |     |      |
| ctg | tgg  | ggg  | ctc  | ctc  | att  | gag  | gaa  | act  | gag  | aaa  | cgc  | cat  | aga  | cgg  | ctg | 5057 |
| Leu | Trp  | Gly  | Leu  | Leu  | Ile  | Glu  | Glu  | Thr  | Glu  | Lys  | Arg  | His  | Arg  | Arg  | Leu |      |
|     | 1560 |      |      | 1565 |      |      |      | 1570 |      |      |      |      | 1575 |      |     |      |
| gag | gag  | gca  | cac  | aag  | gcg  | cag  | cag  | tac  | tac  | ttt  | gat  | gca  | gct  | gaa  | gcc | 5105 |
| Glu | Glu  | Ala  | His  | Lys  | Ala  | Gln  | Gln  | Tyr  | Tyr  | Phe  | Asp  | Ala  | Ala  | Glu  | Ala |      |
|     |      | 1580 |      |      |      |      |      | 1585 |      |      |      |      | 1590 |      |     |      |
| gag | gca  | tgg  | atg  | agt  | gaa  | cag  | gag  | ttg  | tac  | atg  | atg  | tct  | gag  | gaa  | aag | 5153 |
| Glu | Ala  | Trp  | Met  | Ser  | Glu  | Gln  | Glu  | Leu  | Tyr  | Met  | Met  | Ser  | Glu  | Glu  | Lys |      |
|     |      | 1595 |      |      |      |      | 1600 |      |      |      |      | 1605 |      |      |     |      |
| gcc | aag  | gat  | gag  | cag  | agt  | gct  | gtc  | tct  | atg  | ttg  | aaa  | aag  | cac  | cag  | att | 5201 |
| Ala | Lys  | Asp  | Glu  | Gln  | Ser  | Ala  | Val  | Ser  | Met  | Leu  | Lys  | Lys  | His  | Gln  | Ile |      |
|     | 1610 |      |      |      |      | 1615 |      |      |      |      |      | 1620 |      |      |     |      |
| tta | gag  | caa  | gct  | gtt  | gag  | gac  | tat  | gca  | gag  | aca  | gta  | cac  | cag  | ctc  | tcc | 5249 |
| Leu | Glu  | Gln  | Ala  | Val  | Glu  | Asp  | Tyr  | Ala  | Glu  | Thr  | Val  | His  | Gln  | Leu  | Ser |      |
|     | 1625 |      |      |      | 1630 |      |      | 1635 |      |      |      |      |      |      |     |      |
| aag | act  | agc  | cgg  | gcg  | ctg  | gtg  | gct  | gac  | agc  | cat  | ccc  | gaa  | agt  | gag  | cgt | 5297 |
| Lys | Thr  | Ser  | Arg  | Ala  | Leu  | Val  | Ala  | Asp  | Ser  | His  | Pro  | Glu  | Ser  | Glu  | Arg |      |
|     | 1640 |      |      | 1645 |      |      |      | 1650 |      |      |      | 1655 |      |      |     |      |
| att | agc  | atg  | cgg  | cag  | tca  | aag  | gtc  | gac  | aag  | ctg  | tat  | gct  | ggc  | ctg  | aag | 5345 |
| Ile | Ser  | Met  | Arg  | Gln  | Ser  | Lys  | Val  | Asp  | Lys  | Leu  | Tyr  | Ala  | Gly  | Leu  | Lys |      |
|     |      |      | 1660 |      |      |      |      | 1665 |      |      |      | 1670 |      |      |     |      |
| gac | ctt  | gct  | gag  | gag  | agg  | aga  | gga  | aaa  | ctt  | gat  | gag  | agg  | cac  | agg  | ctg | 5393 |



|      |     |     |     |     |     |      |     |     |      |     |     |      |     |     |     |      |
|------|-----|-----|-----|-----|-----|------|-----|-----|------|-----|-----|------|-----|-----|-----|------|
| Asp  | Leu | Ala | Glu | Glu | Arg | Arg  | Gly | Lys | Leu  | Asp | Glu | Arg  | His | Arg | Leu |      |
| 1675 |     |     |     |     |     | 1680 |     |     | 1685 |     |     |      |     |     |     |      |
| ttc  | cag | ctc | aac | aga | gag | gtg  | gat | gac | ctg  | gaa | cag | tgg  | atc | gct | gag | 5441 |
| Phe  | Gln | Leu | Asn | Arg | Glu | Val  | Asp | Asp | Leu  | Glu | Gln | Trp  | Ile | Ala | Glu |      |
| 1690 |     |     |     |     |     | 1695 |     |     | 1700 |     |     |      |     |     |     |      |
| agg  | gaa | gtg | gtc | gca | ggc | tcc  | cat | gag | ttg  | gga | cag | gac  | tat | gag | cat | 5489 |
| Arg  | Glu | Val | Val | Ala | Gly | Ser  | His | Glu | Leu  | Gly | Gln | Asp  | Tyr | Glu | His |      |
| 1705 |     |     |     |     |     | 1710 |     |     | 1715 |     |     |      |     |     |     |      |
| gtc  | acg | atg | tta | caa | gaa | cgg  | ttc | cga | gaa  | ttt | gct | cga  | gac | aca | gga | 5537 |
| Val  | Thr | Met | Leu | Gln | Glu | Arg  | Phe | Arg | Glu  | Phe | Ala | Arg  | Asp | Thr | Gly |      |
| 1720 |     |     |     |     |     | 1725 |     |     | 1730 |     |     |      |     |     |     |      |
| aac  | att | ggg | cag | gag | cgt | gtg  | gat | aca | ggt  | aat | aac | atg  | gca | gat | gaa | 5585 |
| Asn  | Ile | Gly | Gln | Glu | Arg | Val  | Asp | Thr | Val  | Asn | Asn | Met  | Ala | Asp | Glu |      |
| 1740 |     |     |     |     |     | 1745 |     |     | 1750 |     |     |      |     |     |     |      |
| ctc  | atc | aac | tct | gga | cat | tca  | gat | gct | gcc  | acc | att | gct  | gag | tgg | aaa | 5633 |
| Leu  | Ile | Asn | Ser | Gly | His | Ser  | Asp | Ala | Ala  | Thr | Ile | Ala  | Glu | Trp | Lys |      |
| 1755 |     |     |     |     |     | 1760 |     |     | 1765 |     |     |      |     |     |     |      |
| gat  | ggt | ctc | aat | gaa | gcc | tgg  | gct | gac | ctc  | ctg | gag | ctc  | att | gac | aca | 5681 |
| Asp  | Gly | Leu | Asn | Glu | Ala | Trp  | Ala | Asp | Leu  | Leu | Glu | Leu  | Ile | Asp | Thr |      |
| 1770 |     |     |     |     |     | 1775 |     |     | 1780 |     |     |      |     |     |     |      |
| aga  | aca | cag | att | ctt | gct | gcc  | tca | tat | gaa  | ctt | cat | aag  | ttt | tac | cat | 5729 |
| Arg  | Thr | Gln | Ile | Leu | Ala | Ala  | Ser | Tyr | Glu  | Leu | His | Lys  | Phe | Tyr | His |      |
| 1785 |     |     |     |     |     | 1790 |     |     | 1795 |     |     |      |     |     |     |      |
| gat  | gcc | aag | gag | atc | ttt | ggc  | cga | atc | cag  | gac | aaa | cac  | aag | aaa | ctc | 5777 |
| Asp  | Ala | Lys | Glu | Ile | Phe | Gly  | Arg | Ile | Gln  | Asp | Lys | His  | Lys | Lys | Leu |      |
| 1800 |     |     |     |     |     | 1805 |     |     | 1810 |     |     | 1815 |     |     |     |      |
| cct  | gag | gag | ctt | gga | aga | gat  | caa | aac | act  | gtg | gaa | act  | tta | cag | aga | 5825 |
| Pro  | Glu | Glu | Leu | Gly | Arg | Asp  | Gln | Asn | Thr  | Val | Glu | Thr  | Leu | Gln | Arg |      |
| 1820 |     |     |     |     |     | 1825 |     |     | 1830 |     |     |      |     |     |     |      |
| atg  | cac | acc | acc | ttt | gag | cac  | gac | atc | caa  | gct | ctg | ggc  | act | cag | gtg | 5873 |
| Met  | His | Thr | Thr | Phe | Glu | His  | Asp | Ile | Gln  | Ala | Leu | Gly  | Thr | Gln | Val |      |
| 1835 |     |     |     |     |     | 1840 |     |     | 1845 |     |     |      |     |     |     |      |
| agg  | cag | ctg | cag | gag | gat | gca  | gct | cgc | ctc  | cag | gca | gcc  | tat | gca | ggg | 5921 |
| Arg  | Gln | Leu | Gln | Glu | Asp | Ala  | Ala | Arg | Leu  | Gln | Ala | Ala  | Tyr | Ala | Gly |      |
| 1850 |     |     |     |     |     | 1855 |     |     | 1860 |     |     |      |     |     |     |      |
| gac  | aag | gct | gat | gac | atc | cag  | aag | cgt | gag  | aat | gag | gtc  | ctg | gaa | gcc | 5969 |
| Asp  | Lys | Ala | Asp | Asp | Ile | Gln  | Lys | Arg | Glu  | Asn | Glu | Val  | Leu | Glu | Ala |      |
| 1865 |     |     |     |     |     | 1870 |     |     | 1875 |     |     |      |     |     |     |      |
| tgg  | aag | tcc | ctg | ctg | gat | gct  | tgt | gag | ggt  | cgc | agg | gtg  | cgg | ctg | gta | 6017 |
| Trp  | Lys | Ser | Leu | Leu | Asp | Ala  | Cys | Glu | Gly  | Arg | Arg | Val  | Arg | Leu | Val |      |
| 1880 |     |     |     |     |     | 1885 |     |     | 1890 |     |     | 1895 |     |     |     |      |
| gac  | aca | gga | gac | aag | ttc | cgc  | ttc | ttc | agc  | atg | gtg | cgt  | gac | ctc | atg | 6065 |
| Asp  | Thr | Gly | Asp | Lys | Phe | Arg  | Phe | Phe | Ser  | Met | Val | Arg  | Asp | Leu | Met |      |
| 1900 |     |     |     |     |     | 1905 |     |     | 1910 |     |     |      |     |     |     |      |

Gln Phe Ser Arg Asp Ala Ser Val Ala Glu Ala Trp Leu Leu Gly Gln  
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 Trp Asp Glu Arg Phe Ser Ala Leu Glu Arg Leu Thr Thr Leu Glu Leu  
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 Leu Glu Val Arg Arg Gln Gln Glu Glu Glu Arg Lys Arg Arg Pro  
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 2090 2095 2100  
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 Asn Tyr Lys Asn Phe Asn Ser Arg Arg Thr Ala Ser Asp His Ser Trp  
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 Lys Gln Leu Gln Asp Glu Arg Glu Ala Val Gln Lys Lys Thr Phe Thr  
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 Lys Trp Val Asn Ser His Leu Ala Arg Val Ser Cys Arg Ile Thr Asp  
 50 55 60  
 Leu Tyr Thr Asp Leu Arg Asp Gly Arg Met Leu Ile Lys Leu Leu Glu  
 65 70 75 80  
 Val Leu Ser Gly Glu Arg Leu Pro Lys Pro Thr Lys Gly Arg Met Arg  
 85 90 95  
 Ile His Cys Leu Glu Asn Val Asp Lys Ala Leu Gln Phe Leu Lys Glu  
 100 105 110  
 Gln Arg Val His Leu Glu Asn Met Gly Ser His Asp Ile Val Asp Gly  
 115 120 125  
 Asn His Arg Leu Thr Leu Gly Leu Ile Trp Thr Ile Ile Leu Arg Phe  
 130 135 140  
 Gln Ile Gln Asp Ile Ser Val Glu Thr Glu Asp Asn Lys Glu Lys Lys  
 145 150 155 160  
 Ser Ala Lys Asp Ala Leu Leu Leu Trp Cys Gln Met Lys Thr Ala Gly  
 165 170 175  
 Tyr Pro Asn Val Asn Ile His Asn Phe Thr Thr Ser Trp Arg Asp Gly  
 180 185 190  
 Met Ala Phe Asn Ala Leu Ile His Lys His Arg Pro Asp Leu Ile Asp  
 195 200 205

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Phe | Asp | Lys | Leu | Lys | Lys | Ser | Asn | Ala | His | Tyr | Asn | Leu | Gln | Asn | Ala |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Phe | Asn | Leu | Ala | Glu | Gln | His | Leu | Gly | Leu | Thr | Lys | Leu | Leu | Asp | Pro |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Glu | Asp | Ile | Ser | Val | Asp | His | Pro | Asp | Glu | Lys | Ser | Ile | Ile | Thr | Tyr |
|     |     |     |     | 245 |     |     |     |     | 250 |     |     |     |     | 255 |     |
| Val | Val | Thr | Tyr | Tyr | His | Tyr | Phe | Ser | Lys | Met | Lys | Ala | Leu | Ala | Val |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     | 270 |     |     |
| Glu | Gly | Lys | Arg | Ile | Gly | Lys | Val | Leu | Asp | Asn | Ala | Ile | Glu | Thr | Glu |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Lys | Met | Ile | Glu | Lys | Tyr | Glu | Thr | Leu | Ala | Ser | Asp | Leu | Leu | Glu | Trp |
|     | 290 |     |     |     |     | 295 |     |     |     |     | 300 |     |     |     |     |
| Ile | Glu | Gln | Thr | Ile | Ile | Ile | Leu | Asn | Asn | Arg | Lys | Phe | Ala | Asn | Ser |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Leu | Val | Gly | Val | Gln | Gln | Gln | Leu | Gln | Ala | Phe | Asn | Thr | Tyr | Arg | Thr |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     | 335 |     |
| Val | Glu | Lys | Pro | Pro | Lys | Phe | Thr | Glu | Lys | Gly | Asn | Leu | Glu | Val | Leu |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Leu | Phe | Ala | Ile | Gln | Ser | Lys | Met | Arg | Ala | Asn | Asn | Gln | Lys | Val | Tyr |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     | 365 |     |     |     |
| Met | Pro | Arg | Glu | Gly | Lys | Leu | Ile | Ser | Asp | Ile | Asn | Lys | Ala | Trp | Glu |
|     | 370 |     |     |     |     | 375 |     |     |     |     | 380 |     |     |     |     |
| Arg | Leu | Glu | Lys | Ala | Glu | His | Glu | Arg | Glu | Leu | Ala | Leu | Arg | Asn | Glu |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
| Leu | Ile | Arg | Gln | Glu | Lys | Leu | Glu | Gln | Leu | Ala | Arg | Arg | Phe | Asp | Arg |
|     |     |     |     | 405 |     |     |     |     | 410 |     |     |     |     | 415 |     |
| Lys | Ala | Ala | Met | Arg | Glu | Thr | Trp | Leu | Ser | Glu | Asn | Gln | Arg | Leu | Val |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |
| Ser | Gln | Asp | Asn | Phe | Gly | Phe | Asp | Leu | Pro | Ala | Val | Glu | Ala | Ala | Thr |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
| Lys | Lys | His | Glu | Ala | Ile | Glu | Thr | Asp | Ile | Ala | Ala | Tyr | Glu | Glu | Arg |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |
| Val | Gln | Ala | Val | Val | Ala | Val | Ala | Arg | Glu | Leu | Glu | Ala | Glu | Asn | Tyr |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |
| His | Asp | Ile | Lys | Arg | Ile | Thr | Ala | Arg | Lys | Asp | Asn | Val | Ile | Arg | Leu |
|     |     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |
| Trp | Glu | Tyr | Leu | Leu | Glu | Leu | Leu | Arg | Ala | Arg | Arg | Gln | Arg | Leu | Glu |
|     |     |     | 500 |     |     |     |     | 505 |     |     |     |     | 510 |     |     |
| Met | Asn | Leu | Gly | Leu | Gln | Lys | Ile | Phe | Gln | Glu | Met | Leu | Tyr | Ile | Met |
|     |     | 515 |     |     |     |     | 520 |     |     |     |     | 525 |     |     |     |
| Asp | Trp | Met | Asp | Glu | Met | Lys | Val | Leu | Leu | Leu | Ser | Gln | Asp | Tyr | Gly |
|     | 530 |     |     |     |     | 535 |     |     |     |     | 540 |     |     |     |     |
| Lys | His | Leu | Leu | Gly | Val | Glu | Asp | Leu | Leu | Gln | Lys | His | Ala | Leu | Val |
| 545 |     |     |     |     | 550 |     |     |     |     | 555 |     |     |     |     | 560 |
| Glu | Ala | Asp | Ile | Ala | Ile | Gln | Ala | Glu | Arg | Val | Arg | Gly | Val | Asn | Ala |
|     |     |     |     | 565 |     |     |     |     | 570 |     |     |     |     | 575 |     |
| Ser | Ala | Gln | Lys | Phe | Ala | Thr | Asp | Gly | Glu | Gly | Tyr | Lys | Pro | Cys | Asp |
|     |     |     | 580 |     |     |     |     | 585 |     |     |     |     | 590 |     |     |
| Pro | Gln | Val | Ile | Arg | Asp | Arg | Val | Ala | His | Met | Glu | Phe | Cys | Tyr | Gln |
|     |     | 595 |     |     |     |     | 600 |     |     |     |     | 605 |     |     |     |
| Glu | Leu | Cys | Gln | Leu | Ala | Ala | Glu | Arg | Arg | Ala | Arg | Leu | Glu | Glu | Ser |
|     | 610 |     |     |     |     | 615 |     |     |     |     | 620 |     |     |     |     |
| Arg | Arg | Leu | Trp | Lys | Phe | Phe | Trp | Glu | Met | Ala | Glu | Glu | Glu | Gly | Trp |
| 625 |     |     |     |     | 630 |     |     |     |     | 635 |     |     |     |     | 640 |
| Ile | Arg | Glu | Lys | Glu | Lys | Ile | Leu | Ser | Ser | Asp | Asp | Tyr | Gly | Lys | Asp |
|     |     |     |     | 645 |     |     |     |     | 650 |     |     |     |     | 655 |     |
| Leu | Thr | Ser | Val | Met | Arg | Leu | Leu | Ser | Lys | His | Arg | Ala | Phe | Glu | Asp |
|     |     |     | 660 |     |     |     |     | 665 |     |     |     |     | 670 |     |     |
| Glu | Met | Ser | Gly | Arg | Ser | Gly | His | Phe | Glu | Gln | Ala | Ile | Lys | Glu | Gly |
|     |     | 675 |     |     |     |     | 680 |     |     |     |     | 685 |     |     |     |
| Glu | Asp | Met | Ile | Ala | Glu | Glu | His | Phe | Gly | Ser | Glu | Lys | Ile | Arg | Glu |
|     | 690 |     |     |     |     | 695 |     |     |     |     | 700 |     |     |     |     |
| Arg | Ile | Ile | Tyr | Ile | Arg | Glu | Gln | Trp | Ala | Asn | Leu | Glu | Gln | Leu | Ser |
| 705 |     |     |     |     | 710 |     |     |     |     | 715 |     |     |     |     | 720 |
| Ala | Ile | Arg | Lys | Lys | Arg | Leu | Glu | Glu | Ala | Ser | Leu | Leu | His | Gln | Phe |

|      |     |     |      |     |     |     |     |      |     |      |     |     |      |     |     |      |     |  |  |  |  |     |  |  |  |
|------|-----|-----|------|-----|-----|-----|-----|------|-----|------|-----|-----|------|-----|-----|------|-----|--|--|--|--|-----|--|--|--|
|      |     |     |      |     |     |     |     |      |     | 725  |     |     |      |     |     | 730  |     |  |  |  |  | 735 |  |  |  |
| Gln  | Ala | Asp | Ala  | Asp | Asp | Ile | Asp | Ala  | Trp | Met  | Leu | Asp | Ile  | Leu | Lys |      |     |  |  |  |  |     |  |  |  |
| Ile  | Val | Ser | 740  | Asn | Asp | Val | Gly | 745  | His | Asp  | Glu | Tyr | Ser  | 750 | Gln | Ser  |     |  |  |  |  |     |  |  |  |
| Leu  | Val | Lys | 755  | Lys | His | Lys | Asp | 760  | Val | Ala  | Glu | Glu | Ile  | Thr | Asn | Cys  | Arg |  |  |  |  |     |  |  |  |
| Pro  | Thr | Ile | 770  | Asp | Thr | Leu | His | 775  | Glu | Gln  | Ala | Ser | Ala  | Leu | Pro | Gln  | Ala |  |  |  |  |     |  |  |  |
| 785  | His | Ala | Glu  | Ser | Pro | Asp | Val | 790  | Lys | Gly  | Arg | Leu | Ala  | Gly | Ile | Glu  | Glu |  |  |  |  |     |  |  |  |
| Arg  | Cys | Lys | 805  | Met | Ala | Glu | Leu | 810  | Thr | Arg  | Leu | Arg | Lys  | Gln | Ala | Leu  |     |  |  |  |  |     |  |  |  |
| Gln  | Asp | Thr | 820  | Leu | Ala | Leu | Tyr | 825  | Lys | Met  | Phe | Ser | Glu  | Ala | Asp | Ala  | Cys |  |  |  |  |     |  |  |  |
| Glu  | Leu | Trp | 835  | Ile | Asp | Glu | Lys | 840  | Glu | Gln  | Trp | Leu | Asn  | Asn | Met | Gln  | Ile |  |  |  |  |     |  |  |  |
| Pro  | Glu | Lys | 850  | Leu | Glu | Asp | Leu | 855  | Glu | Val  | Ile | Gln | His  | Arg | Phe | Glu  | Ser |  |  |  |  |     |  |  |  |
| 865  | Leu | Glu | Pro  | Glu | Met | Asn | Asn | 870  | Gln | Ala  | Ser | Arg | Val  | Ala | Val | Val  | Asn |  |  |  |  |     |  |  |  |
| Gln  | Ile | Ala | Arg  | Gln | Leu | Met | His | 885  | Asn | Gly  | His | Pro | Ser  | Glu | Lys | Glu  |     |  |  |  |  |     |  |  |  |
| Ile  | Arg | Ala | 900  | Gln | Gln | Asp | Lys | 905  | Leu | Asn  | Thr | Arg | Trp  | Ser | Gln | Phe  | Arg |  |  |  |  |     |  |  |  |
| Glu  | Leu | Val | 915  | Asp | Arg | Lys | Lys | 920  | Asp | Ala  | Leu | Leu | Ser  | Ala | Leu | Ser  | Ile |  |  |  |  |     |  |  |  |
| Gln  | Asn | Tyr | 930  | His | Leu | Glu | Cys | 935  | Asn | Glu  | Thr | Lys | Ser  | Cys | Ile | Arg  | Glu |  |  |  |  |     |  |  |  |
| 945  | Lys | Thr | Lys  | Val | Ile | Glu | Ser | 950  | Thr | Gln  | Asp | Leu | Gly  | Asn | Asp | Leu  | Ala |  |  |  |  |     |  |  |  |
| Gly  | Val | Met | 965  | Ala | Leu | Gln | Cys | 970  | Lys | Leu  | Thr | Gly | Met  | Glu | Arg | Asp  | Leu |  |  |  |  |     |  |  |  |
| Val  | Ala | Ile | 980  | Glu | Ala | Lys | Leu | 985  | Ser | Asp  | Leu | Gln | Lys  | Glu | Ala | Glu  | Lys |  |  |  |  |     |  |  |  |
| Leu  | Glu | Ser | 995  | Glu | His | Pro | Asp | 1000 | Gln | Ala  | Gln | Ala | Ile  | Leu | Ser | Arg  | Leu |  |  |  |  |     |  |  |  |
| Ala  | Glu | Ile | 1010 | Ser | Asp | Val | Trp | 1015 | Glu | Glu  | Met | Lys | Thr  | Thr | Leu | Lys  | Asn |  |  |  |  |     |  |  |  |
| 1025 | Arg | Glu | Ala  | Ser | Leu | Gly | Glu | 1030 | Ala | Ser  | Lys | Leu | Gln  | Gln | Phe | Leu  | Arg |  |  |  |  |     |  |  |  |
|      |     |     |      |     |     |     |     |      |     | 1045 |     |     | 1050 |     |     | 1055 |     |  |  |  |  |     |  |  |  |
| Asp  | Leu | Asp | 1060 | Asp | Phe | Gln | Ser | 1065 | Trp | Leu  | Ser | Arg | Thr  | Gln | Thr | Ala  | Ile |  |  |  |  |     |  |  |  |
| Ala  | Ser | Glu | 1075 | Asp | Met | Pro | Asn | 1080 | Thr | Leu  | Thr | Glu | Ala  | Glu | Lys | Leu  | Leu |  |  |  |  |     |  |  |  |
| Thr  | Gln | His | 1090 | Glu | Asn | Ile | Lys | 1095 | Asn | Glu  | Ile | Asp | Asn  | Tyr | Glu | Glu  | Asp |  |  |  |  |     |  |  |  |
| Tyr  | Gln | Lys | 1105 | Met | Arg | Asp | Met | 1110 | Gly | Glu  | Met | Val | Thr  | Gln | Gly | Gln  | Thr |  |  |  |  |     |  |  |  |
| Asp  | Ala | Gln | 1125 | Tyr | Met | Phe | Leu | 1130 | Arg | Gln  | Arg | Leu | Gln  | Ala | Leu | Asp  | Thr |  |  |  |  |     |  |  |  |
| Gly  | Trp | Asn | 1140 | Glu | Leu | His | Lys | 1145 | Met | Trp  | Glu | Asn | Arg  | Gln | Asn | Leu  | Leu |  |  |  |  |     |  |  |  |
| Ser  | Gln | Ser | 1155 | His | Ala | Tyr | Gln | 1160 | Gln | Phe  | Leu | Arg | Asp  | Thr | Lys | Gln  | Ala |  |  |  |  |     |  |  |  |
| Glu  | Ala | Phe | 1170 | Leu | Asn | Asn | Gln | 1175 | Glu | Tyr  | Val | Leu | Ala  | His | Thr | Glu  | Met |  |  |  |  |     |  |  |  |
| Pro  | Thr | Thr | 1185 | Leu | Glu | Gly | Ala | 1190 | Glu | Ala  | Ala | Ile | Lys  | Lys | Gln | Glu  | Asp |  |  |  |  |     |  |  |  |
| Phe  | Met | Thr | 1205 | Thr | Met | Asp | Ala | 1210 | Asn | Glu  | Glu | Lys | Ile  | Asn | Ala | Val  | Val |  |  |  |  |     |  |  |  |
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| Gln Lys Phe Leu Gln Asp Cys | Gln Glu Leu Ser Leu Trp Ile Asn Glu |      |
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| Lys Met Leu Thr Ala Gln Asp | Met Ser Tyr Asp Glu Ala Arg Asn Leu | 1280 |
| 1285                        | 1290                                | 1295 |
| His Ser Lys Trp Leu Lys His | Gln Ala Phe Met Ala Glu Leu Ala Ser |      |
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| Asn Lys Glu Trp Leu Asp Lys | Ile Glu Lys Glu Gly Met Gln Leu Ile |      |
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| Ser Glu Lys Pro Glu Thr Glu | Ala Val Val Lys Glu Lys Leu Thr Gly |      |
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| Leu His Lys Met Trp Glu Val | Leu Glu Ser Thr Thr Gln Thr Lys Ala | 1360 |
| 1345                        | 1350                                | 1355 |
| Gln Arg Leu Phe Asp Ala Asn | Lys Ala Glu Leu Phe Thr Gln Ser Cys |      |
| 1365                        | 1370                                | 1375 |
| Ala Asp Leu Asp Lys Trp Leu | His Gly Leu Glu Ser Gln Ile Gln Ser |      |
| 1380                        | 1385                                | 1390 |
| Asp Asp Tyr Gly Lys Asp Leu | Thr Ser Val Asn Ile Leu Leu Lys Lys |      |
| 1395                        | 1400                                | 1405 |
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| 1410                        | 1415                                | 1420 |
| Glu Leu Gln Ser Gln Ala Gln | Ala Leu Ser Gln Glu Gly Lys Ser Thr |      |
| 1425                        | 1430                                | 1435 |
| Asp Glu Val Asp Ser Lys Arg | Leu Thr Val Gln Thr Lys Phe Met Glu | 1440 |
| 1445                        | 1450                                | 1455 |
| Leu Leu Glu Pro Leu Ser Glu | Arg Lys His Asn Leu Leu Ala Ser Lys |      |
| 1460                        | 1465                                | 1470 |
| Glu Ile His Gln Phe Asn Arg | Asp Val Glu Asp Glu Ile Leu Trp Val |      |
| 1475                        | 1480                                | 1485 |
| Gly Glu Arg Met Pro Leu Ala | Thr Ser Thr Asp His Gly His Asn Leu |      |
| 1490                        | 1495                                | 1500 |
| Gln Thr Val Gln Leu Leu Ile | Lys Lys Asn Gln Thr Leu Gln Lys Glu |      |
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| Ile Gln Gly His Gln Pro Arg | Ile Asp Asp Ile Phe Glu Arg Ser Gln |      |
| 1525                        | 1530                                | 1535 |
| Asn Ile Ile Thr Asp Ser Ser | Ser Leu Asn Ala Glu Ala Ile Arg Gln |      |
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| Glu Lys Arg His Arg Arg Leu | Glu Glu Ala His Lys Ala Gln Gln Tyr |      |
| 1570                        | 1575                                | 1580 |
| Tyr Phe Asp Ala Ala Glu Ala | Glu Ala Trp Met Ser Glu Gln Glu Leu | 1600 |
| 1585                        | 1590                                | 1595 |
| Tyr Met Met Ser Glu Glu Lys | Ala Lys Asp Glu Gln Ser Ala Val Ser |      |
| 1605                        | 1610                                | 1615 |
| Met Leu Lys Lys His Gln Ile | Leu Glu Gln Ala Val Glu Asp Tyr Ala |      |
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| Glu Thr Val His Gln Leu Ser | Lys Thr Ser Arg Ala Leu Val Ala Asp |      |
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| 1745                        | 1750                                | 1755 |

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| agcatactta  | atttttgttt  | atttattgtg  | agctttttac  | tttaagattt  | tacatgagta  | 7020 |
| atcaaaatta  | aattatagca  | taatgaaatt  | agactcttaa  | caggtacggc  | acacacaagt  | 7080 |
| taatagtact  | ctgctatagg  | tgctatgtta  | cttacaagta  | ttattaacct  | attggcttcc  | 7140 |
| attgtatagt  | agtttagtaac | tatgaaaact  | ggtttgttaag | gaaggaaaac  | tttactacta  | 7200 |
| aggttaggcc  | tgcagttgct  | ctggaacatt  | ccatggagaa  | tgcattcatc  | aaacggcccc  | 7260 |
| aaagaagcta  | cattttgttg  | ggaagctgga  | taagttttag  | gtgcaggacc  | ccaaatgttc  | 7320 |
| tgagaccttt  | ggggccattt  | attactttgt  | acaagcccaa  | taatcctctc  | ttttctgcca  | 7380 |
| agtcctcaac  | ccagaaatgt  | aggcttctgt  | gcaccacacg  | gcacagccca  | ctgattgctg  | 7440 |
| ccaccggctc  | tgtcttggtc  | agtgttacca  | ctgccagcac  | tcaggctgtg  | gcagatgcca  | 7500 |
| gcagctctta  | ccatcagtca  | gagtcttcag  | ggtgtcaagc  | tgttttcatt  | ttttaggcaa  | 7560 |
| atagaacaaa  | agccattttg  | gttcacctcg  | atcacttgaa  | tgatagactc  | aatgccctgt  | 7620 |
| gcctggcagg  | gagcgcttgc  | agagggtgoc  | tagccttaga  | gggctacttc  | agtgtctcta  | 7680 |
| ctgacagaaa  | ctcctgtatc  | tcaaatggat  | ctcgaagttc  | tctagtaagg  | agtcctaagg  | 7740 |
| atgacatgta  | ttgggccact  | agcagggatt  | gaaaacattt  | taaaagaaat  | cctttttctt  | 7800 |
| aggagtaaaa  | gctggtaaaa  | ggggtgactt  | cctggttctg  | atcaaaaacca | gaccaaacc   | 7860 |
| tcattttcagc | aaagccttgc  | aagacactcc  | cttgctcatt  | tgccatattt  | agatgtctta  | 7920 |
| gtggagtcag  | agccctgttt  | ggtatgtgtt  | tttcatgcta  | agtctaaatt  | gtcttttctt  | 7980 |
| ttcatgatgc  | attttttctc  | ttttgtcagg  | ataacatcat  | atagcatctt  | gtttgttttt  | 8040 |
| cctaattctct | atgaacatat  | ctatctacct  | gtaaccgtag  | ataggtatct  | agatagatac  | 8100 |
| caagctttta  | agctctgggc  | cactatgcac  | cattattggg  | tctctgcctt  | aaaacacatc  | 8160 |
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 tttctagctt ccaggcaagg gccacacaag gaaggaaatc cacaggggat tagatgccgg 180  
 ggtggtaact ccaccaggct aggttgact ctgcagccaa cttcctatca gatcaccttg 240  
 cacctatttc cgacccgacc ggaatgcgac tggcttgagg tccagccctt tcgcctgggc 300  
 gggagcagag ccgcggaagc tgcttgagtg tggatggggg taggaagggg ctggagcggg 360  
 aatcctacgg tgcaactggc ctgggcctaa gggtgggcat a atg gag ttg cag agg 416  
 Met Glu Leu Gln Arg  
 1 5  
 aca tcc agc att tca ggg ccg ctg tgc ccg gcc tac acc ggg cag gtg 464  
 Thr Ser Ser Ile Ser Gly Pro Leu Ser Pro Ala Tyr Thr Gly Gln Val  
 10 15 20  
 cct tac aac tac aac caa ctg gaa gga aga ttc aaa cag ctc caa gat 512  
 Pro Tyr Asn Tyr Asn Gln Leu Glu Gly Arg Phe Lys Gln Leu Gln Asp  
 25 30 35  
 gag cgt gaa gct gta cag aag aag acc ttc acc aag tgg gtc aat tcc 560  
 Glu Arg Glu Ala Val Gln Lys Lys Thr Phe Thr Lys Trp Val Asn Ser  
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 cac ctt gcg aga gtg tcc tgc cga atc aca gac ctg tac acg gac ctt 608  
 His Leu Ala Arg Val Ser Cys Arg Ile Thr Asp Leu Tyr Thr Asp Leu  
 55 60 65  
 cga gat gga ccg atg ctc atc aag cta ctg gag gtc ctc tct gga gag 656  
 Arg Asp Gly Arg Met Leu Ile Lys Leu Leu Glu Val Leu Ser Gly Glu  
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 agg ctg cct aaa ccc act aag gga ccg atg ccg atc cac tgt ctg gag 704  
 Arg Leu Pro Lys Pro Thr Lys Gly Arg Met Arg Ile His Cys Leu Glu  
 90 95 100  
 aat gtc gac aag gct ctt caa ttc ctg aaa gag cag aga gtc cat ctt 752  
 Asn Val Asp Lys Ala Leu Gln Phe Leu Lys Glu Gln Arg Val His Leu  
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 gag aac atg ggc tcc cat gac att gtg gat gga aac cac ccg ctg aca 800  
 Glu Asn Met Gly Ser His Asp Ile Val Asp Gly Asn His Arg Leu Thr  
 120 125 130  
 acg ttg gag cta ctg gaa gtg cgc aga cag caa gag gaa gaa gaa aga 848  
 Thr Leu Glu Leu Leu Glu Val Arg Arg Gln Gln Glu Glu Glu Glu Arg  
 135 140 145  
 aag agg ccg cca cct tct ccg gac cca aac acg aag gtt tca gag gag 896  
 Lys Arg Arg Pro Pro Ser Pro Asp Pro Asn Thr Lys Val Ser Glu Glu  
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 gct gag tcc cag caa tgg gat act tca aaa gga gac caa gtt tcc cag 944  
 Ala Glu Ser Gln Gln Trp Asp Thr Ser Lys Gly Asp Gln Val Ser Gln  
 170 175 180  
 aat ggt ttg ccg gct gag cag gga tct cca ccg gtt agt tac cgc tct 992

Asn Gly Leu Pro Ala Glu Gln Gly Ser Pro Arg Val Ser Tyr Arg Ser  
 185 190 195  
 caa acg tac caa aac tac aaa aac ttt aat agc aga cgg aca gcc agt 1040  
 Gln Thr Tyr Gln Asn Tyr Lys Asn Phe Asn Ser Arg Arg Thr Ala Ser  
 200 205 210  
 gac cat tca tgg tct gga atg tgaagttcac taccatttgt caagaaccac 1091  
 Asp His Ser Trp Ser Gly Met  
 215 220  
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 35 40 45  
 Lys Trp Val Asn Ser His Leu Ala Arg Val Ser Cys Arg Ile Thr Asp  
 50 55 60  
 Leu Tyr Thr Asp Leu Arg Asp Gly Arg Met Leu Ile Lys Leu Leu Glu  
 65 70 75 80  
 Val Leu Ser Gly Glu Arg Leu Pro Lys Pro Thr Lys Gly Arg Met Arg  
 85 90 95  
 Ile His Cys Leu Glu Asn Val Asp Lys Ala Leu Gln Phe Leu Lys Glu  
 100 105 110  
 Gln Arg Val His Leu Glu Asn Met Gly Ser His Asp Ile Val Asp Gly  
 115 120 125  
 Asn His Arg Leu Thr Thr Leu Glu Leu Leu Glu Val Arg Arg Gln Gln  
 130 135 140  
  
 Glu Glu Glu Glu Arg Lys Arg Arg Pro Pro Ser Pro Asp Pro Asn Thr  
 145 150 155 160  
 Lys Val Ser Glu Glu Ala Glu Ser Gln Gln Trp Asp Thr Ser Lys Gly  
 165 170 175  
 Asp Gln Val Ser Gln Asn Gly Leu Pro Ala Glu Gln Gly Ser Pro Arg  
 180 185 190  
 Val Ser Tyr Arg Ser Gln Thr Tyr Gln Asn Tyr Lys Asn Phe Asn Ser

| 195  |     |     |     |     | 200 |     |     |     |     | 205 |     |  |  |  |  |  |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|--|
| Arg  | Arg | Thr | Ala | Ser | Asp | His | Ser | Trp | Ser | Gly | Met |  |  |  |  |  |
| 210  |     |     |     |     |     | 215 |     |     |     |     | 220 |  |  |  |  |  |
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| gggttccatt ctcaagaaga tgattttaag taattatcct ttacgcatag ttatcatcac 120      |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| cacaaaaaaaa gattccaacc ttttccacag aactattatg atttattttt atatgaatgt 180     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| atgtattttat tatttatatga actcctataa tgatcacctt tacatatattca cattttcttta 240 |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| ataaattagtt tagccgcgtc cgagggtccg acagctctgc agctccgagc gcgcgactag 300     |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| ccagaaagtt tcaggccatc c atg agc cac cag gaa agg att gcc agc cag 351        |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| Met Ser His Gln Glu Arg Ile Ala Ser Gln 10                                 |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| agg agg aca aca gcc gaa gtc cca atg cac aga tca act gcc aat caa 399        |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| Arg Arg Thr Thr Ala Glu Val Pro Met His Arg Ser Thr Ala Asn Gln 25         |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| agc aag agg agc cgg tca cca ttt gcc agc aca cgt cgt cgc tgg gat 447        |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| Ser Lys Arg Ser Arg Ser Pro Phe Ala Ser Thr Arg Arg Arg Trp Asp 40         |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| gac agc gag agc tcg gga gcc agc ctg gct gtt gag agt gag gat tat 495        |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| Asp Ser Glu Ser Ser Gly Ala Ser Leu Ala Val Glu Ser Glu Asp Tyr 55         |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| tcc agg tgg cgg gat gct gcc gat gct gag gag gct cat gcc gag ggc 543        |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| Ser Arg Trp Arg Asp Ala Ala Asp Ala Glu Glu Ala His Ala Glu Gly 70         |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| cta gcc aga aga ggc cga ggt gag gct gcc agc agc tca gag cca agg 591        |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| Leu Ala Arg Arg Gly Arg Gly Glu Ala Ala Ser Ser Ser Glu Pro Arg 90         |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| tat gct gaa gac cag gat gcc agg agt gaa caa gcg aag gca gac aaa 639        |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| Tyr Ala Glu Asp Gln Asp Ala Arg Ser Glu Gln Ala Lys Ala Asp Lys 105        |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| gtg cca aga cgg cgg cga acc atg gca gac cct gac ttc tgg gca tac 687        |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| Val Pro Arg Arg Arg Thr Met Ala Asp Pro Asp Phe Trp Ala Tyr 120            |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| acc gac gat tac tac cga tac tac gag gaa gat tct gac agc gac aaa 735        |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| Thr Asp Asp Tyr Tyr Arg Tyr Tyr Glu Glu Asp Ser Asp Ser Asp Lys 135        |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| gag tgg atgggct gcc ctg cgc agg aag tac cga agc cga gag caa ccc 783        |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |
| Glu Trp Met Ala Ala Leu Arg Arg Lys Tyr Arg Ser Arg Glu Gln Pro            |     |     |     |     |     |     |     |     |     |     |     |  |  |  |  |  |

| 140  | 145 | 150 |  |
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| cag tcc tcc agc gga gaa agc tgg gag ctt ctg cca gga aag gaa gaa 831<br>Gln Ser Ser Ser Gly Glu Ser Trp Glu Leu Leu Pro Gly Lys Glu Glu<br>155 160 165 170  |     |     |  |
| ctg gaa cgt cag caa gcc gga gct ggg agc ctc gcc agt gct ggc agc 879<br>Leu Glu Arg Gln Gln Ala Gly Ala Gly Ser Leu Ala Ser Ala Gly Ser<br>175 180 185      |     |     |  |
| aat ggc agt ggt tat cct gaa gaa gta caa gac cca tct ctt cag gag 927<br>Asn Gly Ser Gly Tyr Pro Glu Glu Val Gln Asp Pro Ser Leu Gln Glu<br>190 195 200      |     |     |  |
| gaa gaa cag gcc tct ctg gaa gaa gga gaa atc cct tgg ctt cgc tac 975<br>Glu Glu Gln Ala Ser Leu Glu Glu Gly Glu Ile Pro Trp Leu Arg Tyr<br>205 210 215      |     |     |  |
| aat gag aat gaa agc agc agc gag ggt gat aat gag tct acc cat gag 1023<br>Asn Glu Asn Glu Ser Ser Ser Glu Gly Asp Asn Glu Ser Thr His Glu<br>220 225 230     |     |     |  |
| ctc ata cag cct ggg atg ttc atg ctg gat gga aac aac aac ctg gaa 1071<br>Leu Ile Gln Pro Gly Met Phe Met Leu Asp Gly Asn Asn Asn Leu Glu<br>235 240 245 250 |     |     |  |
| gat gac tcc agc gtg agc gaa gac ctc gaa gtg gac tgg agc ctg ttt 1119<br>Asp Asp Ser Ser Val Ser Glu Asp Leu Glu Val Asp Trp Ser Leu Phe<br>255 260 265     |     |     |  |
| gat ggg ttt gcc gat ggc ttg gga gtg gcc gaa gcc atc tcc tac gtg 1167<br>Asp Gly Phe Ala Asp Gly Leu Gly Val Ala Glu Ala Ile Ser Tyr Val<br>270 275 280     |     |     |  |
| gat cct cag ttc ctc acc tac atg gct ctg gaa gag cgt ctg gcc cag 1215<br>Asp Pro Gln Phe Leu Thr Tyr Met Ala Leu Glu Glu Arg Leu Ala Gln<br>285 290 295     |     |     |  |
| gca atg gag acg gcc ctg gca cac ttg gag tct ctc gcc gtt gat gtc 1263<br>Ala Met Glu Thr Ala Leu Ala His Leu Glu Ser Leu Ala Val Asp Val<br>300 305 310     |     |     |  |
| gaa gtg gcc aac cca cca gca agc aag gag agc att gat gcc ctt cct 1311<br>Glu Val Ala Asn Pro Pro Ala Ser Lys Glu Ser Ile Asp Ala Leu Pro<br>315 320 325 330 |     |     |  |
| gag atc ctg gtc acc gaa gat cat ggt gca gtg ggc cag gaa atg tgc 1359<br>Glu Ile Leu Val Thr Glu Asp His Gly Ala Val Gly Gln Glu Met Cys<br>335 340 345     |     |     |  |
| tgt cct atc tgc tgc agc gaa tat gtg aag ggg gag gtg gca act gag 1407<br>Cys Pro Ile Cys Cys Ser Glu Tyr Val Lys Gly Glu Val Ala Thr Glu<br>350 355 360     |     |     |  |
| cta cca tgc cac cac tat ttc cac aag ccc tgc gtg tcc atc tgg ctt 1455<br>Leu Pro Cys His His Tyr Phe His Lys Pro Cys Val Ser Ile Trp Leu<br>365 370 375     |     |     |  |
| cag aag tct ggc acc tgc cca gtg tgc cgc tgc atg ttc cct ccc ccg 1503<br>Gln Lys Ser Gly Thr Cys Pro Val Cys Arg Cys Met Phe Pro Pro Pro<br>380 385 390     |     |     |  |
| ctc taa aagccaaggc tcgtcgtaac agtcagcctg gttacattcc ctgtccgaaa 1559<br>Leu   |     |     |  |

395

cccacaatac tacaggagcc cttgttctaa acttacaatg aaaccagtca gtcaattaga 1619  
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 35 40 45  
 Ala Ser Leu Ala Val Glu Ser Glu Asp Tyr Ser Arg Trp Arg Asp Ala  
 50 55 60  
 Ala Asp Ala Glu Glu Ala His Ala Glu Gly Leu Ala Arg Arg Gly Arg  
 65 70 75 80  
 Gly Glu Ala Ala Ser Ser Ser Glu Pro Arg Tyr Ala Glu Asp Gln Asp  
 85 90 95  
 Ala Arg Ser Glu Gln Ala Lys Ala Asp Lys Val Pro Arg Arg Arg Arg  
 100 105 110  
 Thr Met Ala Asp Pro Asp Phe Trp Ala Tyr Thr Asp Asp Tyr Tyr Arg  
 115 120 125  
 Tyr Tyr Glu Glu Asp Ser Asp Ser Asp Lys Glu Trp Met Ala Ala Leu  
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 Arg Arg Lys Tyr Arg Ser Arg Glu Gln Pro Gln Ser Ser Ser Gly Glu  
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 Ser Trp Glu Leu Leu Pro Gly Lys Glu Glu Leu Glu Arg Gln Gln Ala  
 165 170 175  
 Gly Ala Gly Ser Leu Ala Ser Ala Gly Ser Asn Gly Ser Gly Tyr Pro  
 180 185 190  
 Glu Glu Val Gln Asp Pro Ser Leu Gln Glu Glu Glu Gln Ala Ser Leu  
 195 200 205  
 Glu Glu Gly Glu Ile Pro Trp Leu Arg Tyr Asn Glu Asn Glu Ser Ser  
 210 215 220

Ser Glu Gly Asp Asn Glu Ser Thr His Glu Leu Ile Gln Pro Gly Met  
 225 230 235 240  
 Phe Met Leu Asp Gly Asn Asn Asn Leu Glu Asp Asp Ser Ser Val Ser  
 245 250 255  
 Glu Asp Leu Glu Val Asp Trp Ser Leu Phe Asp Gly Phe Ala Asp Gly  
 260 265 270  
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 275 280 285  
 Tyr Met Ala Leu Glu Glu Arg Leu Ala Gln Ala Met Glu Thr Ala Leu  
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 Ala His Leu Glu Ser Leu Ala Val Asp Val Glu Val Ala Asn Pro Pro  
 305 310 315 320  
 Ala Ser Lys Glu Ser Ile Asp Ala Leu Pro Glu Ile Leu Val Thr Glu  
 325 330 335  
 Asp His Gly Ala Val Gly Gln Glu Met Cys Cys Pro Ile Cys Cys Ser  
 340 345 350  
 Glu Tyr Val Lys Gly Glu Val Ala Thr Glu Leu Pro Cys His His Tyr  
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ctacctggct accagagagc tcaagttgag ttaccaagaa gggttcccag gagcagagat 2820
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tcgtacgcag gcagatgaca ccttatgcca acagggacgc ctgtgaggcc gagaccttga 2940
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<210> 11
<211> 1177
<212> DNA
<213> Mus musculus

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<220>
<221> misc_feature
<222>
<223> n=a or c or t or g

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<400> 11
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catgctcctg tactcgtcta agaagaagat ctcatccctc acgaccagag 240
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<210> 12
<211> 2998
<212> DNA
<213> Mus musculus

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<220>  
 <221> misc\_feature  
 <222>  
 <223> n=(a or c or t or g)

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<400> 12
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aaaccagata tctagtagtc accaaagcca cactttgaat tcgaaaagct tagcactgta 180
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tataatgagt ttaataattt gggttcatct cctttaatca gaccagtgtt cactactagc 360
tgggtctctg gaataggcac agatatattc atctggagtg tcacacatac tctgtgcgcg 420
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ttaatgacaa ctttctagaa ataagaacta taccctaaaa gattgaaata ttcttagttt 600
tctttatcta catcagaaat tgttttagctg atacaacata cttatattgt ttaaggaatt 660
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<210> 13  
 <211> 1121  
 <212> DNA  
 <213> Mus musculus



<220>  
 <221> misc\_feature  
 <222>  
 <223> n=a or c or t or g

<400> 13  
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 agtaccacag ntaatgtgtc ncccacatgt cactgaagga gtgtcagttc tcagcatttt 180  
 acctttaatt ttaattttta cctctaaatg cgcttttagga ggctaccac agttgatgac 240  
 aaacagtgtg gccaggcatg ccagaactgt taccagcaga acttttggcc gactgtagct 300  
 ggcagtgttc tcagtagtgc agttcatgcc tgggtgggtg aactagggtg caacgaagtc 360  
 actttgaact cttttgctaa ctaaataagc caaataaaca aatcatgaaa tactgattag 420  
 caatgcaata tttcatggca tgggaagagc ttcgacttct ccatcggtga caaggagcag 480  
 cttctggaag gaaggtctgg agaaaacaac tgacggggag ctccgaggag ccctgaacac 540  
 gtacactcaac agcactggcg ttgacacagc tgctgtggtc cagcagtcac tcagtggaga 600  
 gtgccaagag gtgggcagac agncagncct acttcttcat ctccaggatg gcacttccag 660  
 gcccacggtt cttagcacta cagatgttgc agtattgtgc aggagcattc atgtctcgga 720  
 taggcaggca ctccttgtgg aacatgtgcc ggcagtggaa gaccaccacg ctgaagggtc 780  
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 ccagaacgcc tttcattttg gttcggngca ttttttcaca caccaacgac aatgagtcag 900  
 ctacgaggat tttcttgcag ccttcccga gagaatctt caagttataa tcttgcagaa 960  
 ttttaaccac ggaatctctc aaattgggaa tctccattcc ttccttaatt cgggtggataa 1020  
 gtagaatcgg gtccacatgt gtgccaatgt tgttcaacaa gccagtgata aatggtggtt 1080  
 tgtcgaatga gtatagaatc agatcttctc gtgccgaatt c 1121

<210> 14  
 <211> 779  
 <212> DNA  
 <213> Mus musculus

<220>  
 <221> misc\_feature  
 <222>  
 <223> n=a or c or t or g

<400> 14  
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 cccaaccctt tcattcctcc ttcagttgtc aaagacaact taacatccaa gactaacaag 180  
 caagatgact caggagcatg gncctgggt tcccctggca ccatgcatgg tgatgtagt 240  
 taaggctgac ttagctctta gcaaccttgg ttgggatagc ttaagctcat ctccactttc 300  
 ctaccaaaca gaaaagaatt tgagtcctct tgctatgagg ctctcgctcc catctcaggc 360  
 gagcttctctg cccctcaccg aagcttggga ggtagagtta tggagagggc aaggaagcag 420  
 gactggaaag atagacttat ggatccacca ctcataaagt cacaagtcc cctcacacct 480  
 gctagactta gactctaaat cattacgttg tcaccaacag aggtgactcc tcaaccacaa 540  
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 cacctgtgat gaagtcacag caataggtga tgcacaaaaa gcccacataa aatgcaagac 660  
 agncaaacag aagccctgtc tgtccccatt ggtgggtaat gtagctgatg tggctgggtc 720  
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<210> 15  
 <211> 981  
 <212> DNA  
 <213> Mus musculus

<220>  
 <221> misc\_feature  
 <222>  
 <223> n=(a or c or t or g)

<400> 15  
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 agacccaaaa aaataaatat gaggnacgtc caggctggga ctcaggtcac tgctgtgctg 120

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agccatcgtc agagaagttt cttcttttnt tttgatagga gctaacacag cgacccacan 180
ctggacagnc tgcagtgagt gagtgtgtaa gtgacctaaa agtgatgtct tcattaatct 240
cccctcccca ggcntcaggg agctctgagg aagaggaggc agaaagatgg tgagagccag 300
cagggatgga ggacaccaag gaagcagtgt cttccgacac aacaggactg gcatttagga 360
agtcacagag gctgtggctg cccagggcct gcacgggtcca agctggctga gattccagtg 420
ctgagagaga caattcaaca cggntcccca cccctagnca agaagttatc tccaactgat 480
atccacttgc aaaggaaaaa attagggggn tagagagatg gctcagtggg taagagcact 540
gacttanaaa atagaaatng canattngnt nngangttng cnaaatngct gagaaatggc 600
caattggctg gaaaacttgc aacattgcct ggagaactgc caaattgcct ggagagctgc 660
caaattggcc tggagagctg cctacatggc ctggagagct gccacatgg cctggagAAC 720
tggctacatg tcctggagag ctgccaacat gtcctggaga tctgcctaca tggcctggag 780
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aggcctctct aagccgaatt c 981

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<210> 16
<211> 685
<212> DNA
<213> Mus musculus

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<220>
<221> misc_feature
<222>
<223> n=(a or c or t or g)

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<400> 16
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tccactatac gtctgcttta tacaataata ttgnntaaat ttgnctctat catgaaatac 180
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acnacttggg ggtgtaaagg ttacccacnc nattantgga ggttcttctg agttccagag 360
anaangantg agccaccngg aattctccct aaacacactt tgatcatttc ctgcctaacc 420
ctgcagagga aatattaata ccctgtagta ccaaaggaaa caaataagaa ggaagactgn 480
tctctcatgt ctggaggaag tttggtgaag gagtcttctg tttgctcaca taggagagat 540
ctaatacagc cactatccat aattaaaaat ctctgtgaga gaggcattgac gaggttctcc 600
cagtctgtca agggatgtga atatgtgttn ccctgtcatc ctgtcatgaa gcctctcttt 660
ctctctctct cctcgtgccg aattc 685

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<210> 17
<211> 471
<212> DNA
<213> Mus musculus

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<220>
<221> misc_feature
<222>
<223> n=(a or c or t or g)

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<400> 17
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angtnggtn aatanaccng gggaggtgtc tgaaaanagt ggnacgtac tgttctcaga 180
cccagnggaa gncatcagag tcccctgggg ttggaattaa agatgtttgt gagtcnctgc 240
gtgtatcctg gacttcaaac ccgggtcttc ttcaagagca gccagtgtct ttaaccactg 300
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tagccaatnc agtctatgac gatttccttt tagcagttct tgtttgtttt cttaatgata 420
gccatactga ttgctgagat ttacagcagc actagcaagc tggaactcga g 471

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<210> 18
<211> 467
<212> DNA
<213> Mus musculus

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<220>  
 <221> misc\_feature  
 <222>  
 <223> n=(a or c or t or g)

<400> 18  
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 tttttnnnnn aanaaanttt taaagttttt ttttttttat naaaannttt ccaagggggg 120  
 gangggtag aaganagcca naggctggnc cccctgccca gaaaaacca gaggggggtt 180  
 gatgtcccca agtccagttg tcaccctgaa gaagttcccc acgatttccc tgggtggcccc 240  
 ccgggagtag gtccagagtg tcaccctttc catttgggag ctgtgggaag ggngtgggnt 300  
 ccctcccagn ggggccccaa acccttctcc tgaacagntc ctgatttctg accatctttc 360  
 caattccacg gattcaaaga gcatgaccct aggtaagcaa gccaggtcaa gagcattgct 420  
 tgtctgnagg aaaaggaagg gtccctcctg gcctcgtgcc gaattcc 467

<210> 19  
 <211> 13  
 <212> PRT  
 <213> Mus musculus

<400> 19

Glu Leu Gln Arg Thr Ser Ser Val Ser Gly Pro Leu Ser  
 1 5 10

<210> 20  
 <211> 14  
 <212> PRT  
 <213> Mus musculus

<400> 20

Phe Asn Ser Arg Arg Thr Ala Ser Asp His Ser Trp Ser Gly  
 1 5 10

<210> 21  
 <211> 13  
 <212> PRT  
 <213> Mus musculus

<400> 21

Leu Arg Arg Lys Tyr Arg Ser Arg Glu Gln Pro Gln Ser  
 1 5 10

<210> 22  
 <211> 18  
 <212> PRT  
 <213> Mus musculus

<400> 22

Ser Ala Gln Ser Leu Val Val Thr Leu Gly Arg Val Glu Gly Gly Ile  
 1 5 10 15

Arg Val

<210> 23  
 <211> 19  
 <212> PRT  
 <213> Mus musculus

<400> 23

Cys Ser Ala Gln Ser Leu Val Val Thr Leu Gly Arg Val Glu Gly Gly  
 1 5 10 15

Ile Arg Val

<210> 24  
 <211> 17  
 <212> PRT  
 <213> Mus musculus

<400> 24

Lys Ile Glu Gly Ser Ser Lys Cys Ala Pro Leu Arg Pro Ala Ser Arg  
 1 5 10 15

Leu

<210> 25  
 <211> 17  
 <212> PRT  
 <213> Mus musculus

<400> 25

Cys Ala Pro Leu Arg Pro Ala Ser Arg Leu Pro Ala Ser Gln Thr Leu  
 1 5 10 15

Gly

<210> 26  
 <211> 16  
 <212> PRT  
 <213> Mus musculus

<400> 26

Pro Pro Arg Glu Tyr Arg Ala Ser Gly Ser Arg Arg Gly Met Ala Tyr  
 1 5 10 15

<210> 27  
 <211> 17  
 <212> PRT  
 <213> Mus musculus

<400> 27

Pro Pro Arg Glu Tyr Arg Ala Ser Gly Ser Arg Arg Gly Met Ala Tyr  
 1 5 10 15

Cys

<210> 28  
 <211> 16  
 <212> PRT  
 <213> Mus musculus

<400> 28

Cys Lys Val Pro Arg Arg Arg Arg Thr Met Ala Asp Pro Asp Phe Trp  
 1 5 10 15